EXPERIMENT MANUAL

Perfur

Sweet Candy Perfume Lab

WARNING! Not suitable for children under 8 years old. For use under adult supervision. Contains some chemicals which present a hazard to health. Read the instructions before use, follow them and keep them for reference. Do not allow chemicals to come into contact with any part of the body, particularly the eyes and mouth. Keep small children and animals away from experiments. Keep the kit out of reach of children under 8 years old. Contains fragrances that may cause allergies. Discontinue using if irritation occurs. The liquid coloring may stain. When using the kit, do not work near, or apply to, textiles or furniture.

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers and in manual carefully. Not to be used by children except under adult supervision.

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Checklist:

J	No.	Description	Quantity	Part No.
0	1	Cotton candy fragrance packet (4 strips)	1	550039-1A1
0	2	Lemon fragrance packet (4 strips)	1	550039-1A2
0	3	Cinnamon fragrance packet (4 strips)	1	550039-1A3
0	4	Peppermint fragrance packet (4 strips)	1	550039-1A4
0	5	Vanilla fragrance packet (4 strips)	1	550039-1A5
0	6	Chocolate fragrance packet (4 strips)	1	550039-1A6
0	7	Vial, 4-ml with stopper lid	4	550039-2
0	8	Vial, 4-ml with screw lid	2	550039-2a
0	9	Sticker sheet	1	550039-3
0	10	Measuring cup, 30-ml	1	550039-4
0	11	Syringe, 30-ml	1	550039-5
0	12	Cotton balls, bag of 10	1	550039-6
0	13	Tweezers	1	550039-7
0	14	Spatula (stirring stick)	2	550039-8
0	15	Atomizer bottle	1	550039-10A
0	16	Perfume bottle holder	1	550039-10B
0	17	Red dye, 5 ml	1	550039-13
0	18	Laboratory station	1	550039-16

The parts not included in the kit are marked in *italics* in the YOU WILL NEED lists at the beginning of each experiment.

YOU WILL ALSO NEED:

Zipper plastic storage bags, water, sheet of thick paper, scissors

INGREDIENTS: RED COLORING (5 mL/0.17 FL OZ; Aqua (Water / Eau), Butylene Glycol, Phenoxyethanol, Chlorphenesin, Red 40 / CI 16035), BASE PERFUMES (Propylene Glycol, PEG-40 Hydrogenated Castor Oil, Fragrance / Parfum)

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* TIP

YOU CAN FIND LOTS OF INTERESTING SCIENTIFIC EXPLANATIONS AND BACKGROUND INFO IN THE "CHECK IT OUT" SECTIONS ON PAGES 10, 11, AND 12.



Set up your own perfume lab station!

> Oh là là! Let's make some sweet-smelling perfumes!

> > Learn where fragrances come from!

Learn how your nose and brain enable you to smell!

SAFETY INFORMATION



WARNING!

Not suitable for children under 3 years old. Small parts — Choking hazard. Keep the packaging and instructions as they contain important information.

Safety Rules

- \rightarrow Clean all equipment after use.
- → Make sure that all containers are fully closed and properly stored after use.
- → Ensure that all empty containers are disposed of properly.
- \rightarrow Wash hands after carrying out experiments.
- → Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.

 \rightarrow Do not eat or drink in the experimental area.

- → Take off all contaminated clothing immediately.
- → May stain some fabrics. Protect and cover playing area before use.

- ightarrow Do not leave cosmetics in the sun or in very hot areas.
- → Always store this experiment kit in a cool place that is inaccessible for small children.
- → If at any time you see mold or discoloration on any of your products or in any of the ingredients, do not use it and put it in the trash immediately.
- → DISPOSAL ADVICE: Put in household waste. Do not flush down sink.

First Aid Information

- → In case of eye contact: Wash out eye with plenty of water, holding eye open if necessary. Rinse from the nose outwards. Seek immediate medical advice.
- → If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- → In case of inhalation: Remove person to fresh air. For example, move person into another room with open windows or outside.
- \rightarrow In case of doubt, seek medical advice without delay. Take the chemical and its container with you.
- \rightarrow In case of injury always seek medical advice.

Poison Control Centers (United States)

In case of emergency, your nearest poison control center can be reached everywhere in the United States by dialing the number:

1-800-222-1222

Local Hospital or Poison Centre (Europe)

Record the telephone number of your local hospital or poison centre here:

Write the number down now so you do not have to search for it in an emergency.

Sweet Candy Perfume Lab

IMPORTANT INFORMATION

Dear Parents and Adults,

Children want to explore, understand, and create new things. They want to try things and do them by themselves. They want to gain knowledge! They can do all of this with Thames & Kosmos experiment kits. With every single experiment, they grow smarter and more knowledgeable.

With this experiment kit, you will be accompanying your child on an introductory exploration of the art and science of perfume making and the biology of the sense of smell. Please support your child in his or her experiments and help with both advice and in physically performing experimental steps when help is needed.

Your child can create his or her own custom perfume from the fragrances provided. The fragrances have good skin compatibility and are thoroughly safety tested. However, as with all cosmetic products, the possibility of an allergic reaction cannot be totally ruled out. Each time your child makes a new perfume, we recommend conducting a patch test as described below.

Please read and follow these instructions as well as the safety rules, the first aid information, and the ingredient information on the previous pages before starting. This kit is not suitable for children under 8 years of age and is intended for use under adult supervision. Keep this kit out of reach of children under 8 years old. Discuss the warnings, safety information and the possible hazards with the child or children before commencing the activities. Only carry out those activities which are listed in the instructions.

A dedicated "laboratory" room will not be necessary for these simple experiments. A sturdy table with a washable, heat-resistant surface is good enough. It should be well lit and ventilated, equipped with a nearby water tap, and not too close to any stored foods. The surroundings should be free of all obstacles. Always get the required materials ready before beginning an experiment. Your child should wear old clothes (or an old smock). After completing the experiments, he or she should pick up and clean the work area and thoroughly wash his or her hands. Put any waste in the household trash.

It is recommended that the diluted fragrances and finished perfumes be used in one week. Please dispose of these solutions after one week.

We hope you and your child have a lot of fun with experimenting and creating perfumes!



PATCH TESTING FOR ALLERGIC REACTIONS

- To conduct a patch test, dab a small amount of the fragrance solution or finished perfume onto your finger.
- 2. Then apply a thin smear to your inner wrist.
- 3. Wait five minutes.
- 4. Wipe off the solution and wash the area with soapy water.
- 5. If there is no irritation or discoloration, it is fine to use.
- 6. For a more thorough test, put the solution on an adhesive bandage and stick it to your wrist overnight. Use bandages that you know you are not allergic to.

5 minutes

Cocoa-Mint Dream? Citrus Creamsicle? What will your designer perfume creation be? Follow your nose through the candy shop as you explore the science and art of making perfumes!

Smells so sweet

Setting up your perfume laboratory

You will need

- Laboratory station
- All kit contents

Here's how

 Choose a clean, uncluttered work area in which to set up your laboratory station. The area should be well lit and ventilated, close to a water supply, and away from food. Choose a stable, stain-resistant work surface.

- 2. Cover the work surface in old newspaper or paper towels to protect it from spills.
- Place the laboratory station on the covered surface and load all of the tools and materials into their designated compartments, as shown in the diagram below.
- 4. Decorate your station, tools, and containers with the stickers from the sticker sheet.



Mixing your first perfume

Start by learning how to extract the individual fragrances and making a perfume by combining two fragrances. A perfume is a mixture of multiple fragrances.

You will need

– All kit contents

- Zipper plastic storage bags
- Water

Here's how

- You will use the syringe to extract the fragrances and make fragrance solutions, which can then be combined into perfumes. Pull the syringe plunger out of the tube.
- 2. Choose one of the six fragrance packets. Each packet contains four paper strips that have been soaked in a concentrated fragrance.
- 3. Tear open the packet with your fingers.
- 4. Use the tweezers to remove one fragrance strip from the packet. Try not to touch the fragrance strips with your hands, because they have a very concentrated fragrance on them.

IMPORTANT! Keep the unused fragrance strips in their original packets and put the open packets into a zipper plastic storage bag to contain the smell.

- 5. Put the fragrance strip into the syringe tube.
- 6. Push the plunger almost all the way down into the tube, crushing the paper strip a little.
- 7. Fill the measuring cup with 10 ml of water.



- Put the tip of the syringe into the water in the measuring cup. Pull up on the plunger, keeping the syringe tip in the water the entire time. Water will be drawn up into the syringe. Stop when the plunger seal is at the 5-ml mark.
- 9. Pour the remaining water down the sink drain.
- 10. Turn the syringe so the syringe tip is facing upward. Pull the plunger out slowly until the seal is at about the 10-ml mark. This will draw some air into the syringe.
- 11. Cover the syringe tip with your finger and shake the syringe vigorously in your hand to mix the fragrance into the water. Shake it until the paper strip disintegrates into a soft mush.
- 12. Gently squeeze all of the fragrance solution out of the syringe into the empty measuring cup. The wad of paper will remain in the syringe.
- Tap the open end of the syringe tube down on your protected work surface so the paper wad falls out of the tube.
- 14. Tear off about one third of a cotton ball.
- 15. Push the piece of cotton down into the syringe tube all the way.
- 16. Holding the syringe with its tip directly above one of the 4-ml vials (the small vials with stopper lids), slowly and carefully pour the fragrance solution from the measuring cup into the syringe. This will filter any paper fibers out of the solution, so you have a pure fragrance solution. Small bubbles and particles in the solution may give it a milky appearance, which is fine. Most of the paper fibers will have been removed.



- 17. Keeping the syringe tip above the vial the entire time, push the plunger down into the tube all the way. This will squeeze the remaining solution out of the cotton and into the vial. You should have 3 or 4 ml of the fragrance solution.
- Now that you have extracted your first fragrance, repeat steps 2 through 17 choosing a different fragrance packet.
- 19. Once you have two extracted fragrance solutions, combine them in the clean measuring cup to make your first perfume! You want a total of 4 ml of perfume, so you may want equal amounts of both fragrances, or more of one than the other. Add some of the first fragrance to the measuring cup.
- 20. Now add some of the second fragrance to the cup. Continue to add the two fragrances to the cup until you have 4 ml of a perfume mixture that is to your liking.
- 21. If you want a slightly pink perfume, you can add one drop of red dye. You do not want the perfume to stain clothing or other materials, so do not add more than a drop. Stir the perfume solution with the spatula.
- 22. Carefully pour the finished perfume into the atomizer bottle if you want to use it right away. Pour it into one of the vials with the screw lids if you want to save it for later. You can save your extracted fragrance solutions and finished perfumes for up to one week. After one week, you must discard them. Write the expiration date on each bottle.
- 23. Place the atomizer bottle in the holder.
- 24. Your fragrance is ready to use! Do not spray it directly on clothing or other items that can be stained. Always patch test your perfumes before use, as described on page 3.



EXPERIMENTS 3-10

Designing more complex perfumes

Now that you know how to extract the fragrances and mix them into perfumes, you can be creative and design your own perfumes!

You will need

All kit contents

- Zipper plastic storage bags
- Water
- Sheet of thick paper
- Scissors

Here's how

 Decide which fragrances you want to try mixing and follow the instructions in experiment 2 to combine them into a perfume.



- 2. You may want to make some test strips. These are simply long, thin strips of thick paper (blotting paper works best) onto which you can dab a small amount of perfume oil in order to smell it. Simply use scissors to cut them from a sheet of thick paper.
- 3. Use the table below to record your perfume formulas. There are four fragrance strips in each packet, and there are six packets. Each fragrance strip makes about 4 ml of solution. Therefore, depending on how you concoct your perfumes, you could make up to 96 ml of fragrance solutions, and 24 different perfumes. But it is entirely up to you how you combine the fragrances into perfumes! Have fun!

Example perfume formula	Perfume Name ChocoMint Brea	Cotton Candy eze O ml	Lemon Cinnan O mt O	non Poppermint	Vanilla 1 mt 2	te ml
Perfume Name	Cotton Candy		Cinnamon	Peppermint		Chocolate
1	ml	ml	ml	ml	ml	ml
2	ml	ml	ml	ml	ml	ml
3	ml	ml	ml	ml	ml	ml
4	ml	ml	ml	ml	ml	ml
5	ml	ml	ml	ml	ml	ml
6	ml	ml	ml	ml	ml	ml
7	ml	ml	ml	ml	ml	ml
8	ml	ml	ml	ml	ml	ml

Our Complex Sense of Smell

Smells are generally a complex mix of different components. However, your nose can mostly tell you, based on a few elementary smells, whether a particular smell is a freshly brewed cup of peppermint tea or a recently peeled orange. Scientists working with smells estimate that we can detect between 4,000 to 10,000 different fragrances and smells. But a human being's **sense of smell** is just average in comparison to the super special smelling capability of some animals. A hunting dog's smelling organ can sense the sweat from a person's feet even if they are covered with thick, recently washed socks inside heavy rubber boots!

FROM THE NOSE TO THE BRAIN

We recognize fragrances and smells and store them in one of the most primitive parts of the brain. Our **nose** and **brain** communicate almost instantaneously.

THE PHYSIOLOGY OF SMELL

When we breathe, small particles of fragrance are carried by the air into the nose and transported to the **olfactory epithelium**, a membrane that is located way up in the nasal cavity under your brain. Olfactory is a word that means relating to the sense of smell. In the olfactory epithelium, an area about the size of a quarter, there are more than 10 million **olfactory cells**. Each of these cells has **cilia**, or microscopic hairs, on it. The cilia are sensitive to molecules in the air. In fact, the smelling cells are very specialized and different cells have evolved to sense different smells. Scientists have identified over 20 different smelling cells.

When a fragrance molecule comes in contact with the correct smelling cell for it, an electric impulse, or nerve signal, is released which is passed on instantaneously through the **olfactory nerves** to the **olfactory bulb**. From there, the smelling message is passed on to other parts of the brain, especially to the **limbic system**.

The limbic system controls our moods and feelings and also participates in a collection and management of longterm memory. This is one of the reasons that we can remember smells so well.





CROSS SECTION OF THE OLFACTORY EPITHELIUM The smelling cells — specialized cells for detecting smells — are located here.

WHAT DO I SMELL HERE?

If the smell is strong enough, the message will be passed on to a developmentally younger part of the brain called the **olfactory cortex**. Its nerve cells translate the impulses they receive from the olfactory bulb into an identifiable impression of a smell, such as a flowery fragrance or foul odor. Without the olfactory cortex, we would have no conscious awareness of smells.

HOW IS A SMELL CAPTURED IN A FRAGRANCE?

This is an interesting question because smells are almost always ephemeral, or short-lived. It can be quite challenging to capture and process them. Scientists have established that what we most often perceive as fragrances are light, evaporating **ethereal oils.** The word ethereal comes from the Greek word "aither" for "upper air," and means heavenly or delicate. In nature, ethereal oils play many important biological roles. They provide a source of information for insects and a protective shield for some plants. If you were to ask a chemist what perfume is, the chemist might answer: "Perfume is a water-alcohol solution of ethereal oils from vegetable, animal, and/or synthetic origin." But how do these essences get into the solutions?



Extracting Fragrances with Water

The oldest and simplest way of extracting fragrant material from plants is to brew them by boiling them in water, similar to how tea is prepared. When they are heated, the ethereal oils from the source materials are dissolved in the water, and the released fragrant oils can evaporate. Unfortunately, the heat can damage the oils, so this method is not used often in commercial fragrances.

Extracting Fragrances with Fat

Another old method of fragrance extraction is the **enfleurage** (French, fleur = flower). In this method, fragrances are extracted from plants with the help of animal fat, such as pork lard. Plant parts, like flower petals, are pressed into a layer of fat spread out on glass sheets. The fat extracts the fragrant material from the plant over a number of days. Then, the fragrant oils are extracted from the fat with the help of alcohol. After that, the alcohol is evaporated, and the result is a clean ethereal oil.





Extracting Fragrances with Steam

The steam distillation process was developed in the Middle East in the Middle Ages. This process is used to extract oils from plants with the help of superheated steam. The steam opens the plant cells. The oils inside are released and are carried away from the plants by the steam. The steam cools into water, and the oils are simply filtered out of the water.

Extracting Fragrances with Solvents

A method that is still used almost everywhere for fragrance extraction is called solvent extraction. This process was developed about 200 years ago. Fresh plant parts are ground up and covered with a warm solvent that evaporates easily. This is repeated until the remaining liquid is totally saturated with ethereal oils from the plants. After, the solvent is totally evaporated from the extract. This process can be performed at low temperatures because the solvent is easily evaporated. This makes the method very gentle.





PLANTS: FLOWERS, LEAVES, ROOTS

Most pleasurable fragrances are derived from plants. For example, one of the most bountiful suppliers of fragrances is the orange tree. We derive neroli (orange blossom) from its flowers, orange oil from orange peels, and petitgrain (citrusy and woody smell) from its leaves and twigs.

ANIMAL SOURCES

Fragrant materials from the animal kingdom are also used by perfumers. Each material by itself seldom smells very good and can be rather strong, but diluted and mixed with other fragrances, they add a special touch to many perfumes. For example, amber, a secretion from sperm whales, is a highly sought-after fragrance.



SYNTHETIC SOURCES

Nowadays, chemists can synthesize almost any fragrance in the laboratory. This practice began in 1856 with the discovery of cinnamic aldehyde, the main ingredient in the flavor of cinnamon. In 1876, scientists made vanillin, another aldehyde. Today, vanillin is used as a synthetic substitute for natural vanilla. Aldehvdes are made from alcohols from which some of the hydrogen is removed, and they tend to be very smelly!



The Art of Perfume Design

Perfumers are people who create perfumes. In France, a perfumer is called **le nez**, which means "the nose." The nose is the most important tool in the craft, because the nose's keen ability to smell and recognize fragrances is what allows a perfumer to create the most appealing fragrances.

Most people can distinguish about 4,000 different smells. A good perfumer has up to 10,000 fragrance elements in his smell memory. The perfumer works to develop new perfumes by combining scents from hundreds of small bottles in his or her lab, similar to how an artist paints a picture by combining pigments together to form many different colors. Nowadays, perfumers work with the help of a strong knowledge in chemistry. With chemistry, it is now possible to separate natural fragrances into their individual components. This allows perfumers to not only reconstruct natural fragrances, but also to invent new ones. Only a perfumer's nose can evaluate the fragrance elements and mix them together in the correct proportions to yield an exquisite fragrance.



COCO'S CREATION Chanel No. 5, the most famous perfume in the world, was first produced in 1921. It became not only the most successful fragrance creation, but was also the first one to contain a fully synthetic material, namely an aldehyde. It also contains natural, ingredients: ylang-ylang llowers are the core of the fragranct



THE FRAGRANCE WHEEL

Fragrances are organized into families with similar properties. Perfumers classify fragrances into groups based on their origins and properties:

- Floral fragrances: derived from flower oils like rose, jasmine, elder, lily of the valley, and tuberose.
- Green fragrances: eucalyptus, pine, citrus, lavender, rosemary, camphor, and basilica
- Animal fragrances: musk, civet, ambergris, castor
- Spicy and woody fragrances: oak moss, sandalwood, myrrh, cedar, cinnamon and clove bark

These days, perfumers are working with even finer differentiations. The new system includes fragrances of synthetic origin, such as **aldehydes**. This is illustrated in the fragrance wheel to the left.

A PERFUME EVAPORATES IN THREE STEPS

Practically all great perfumes are complicated mixtures of innumerable individual components. Some are composed of more than 700 natural or synthetic fragrances. Classically composed perfumes are experienced in three phases:

- The head note is the first impression that you receive from the perfume. It lasts only for a few minutes, and should draw you in and evoke curiosity.
- The heart note, also called bouquet, can only be perceived some time after the application of the perfume. It forms the fragrance character of the perfume that can be sensed for several hours.
- The base note, also called fond, forms the foundation on which the perfume is based. It allows the fragrance to fade out pleasantly, and can last as long as a whole day. This note can only be sensed many hours after application.

But there are also fragrances with a single fragrance note. Typical examples of this are lavender or rose water. Both "waters" result as the by-products of steam distillation of the fragrance oils themselves. An additional group is called the linear fragrances. For these perfumes, the character of the fragrance does not change even over an extended period of time. The fragrance stays on a single "line."





Kosmos Quality and Safety

More than one hundred years of expertise in publishing science experiment kits stand behind every product that bears the Kosmos name. Kosmos experiment kits are designed by an experienced team of specialists and tested with the utmost care during development and production. With regard to product safety, these experiment kits follow European and US safety standards, as well as our own refined proprietary safety guidelines. By working closely with our manufacturing partners and safety testing labs, we are able to control all stages of production. While the majority of our products are made in Germany, all of our products, regardless of origin, follow the same rigid quality standards.

Do you have any questions? Our customer service team will be glad to help you!

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